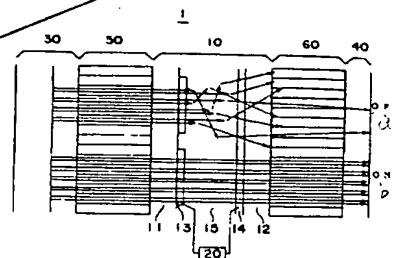


(54) LIQUID CRYSTAL DISPLAY DEVICE

(11) 5-53100 (A) (43) 5.3.1993 (19) JP
 (21) Appl. No. 3-236878 (22) 26.8.1991
 (71) FUJI XEROX CO LTD (72) YASUHIRO UNO
 (51) Int. Cl.⁵ G02F1/1335

PURPOSE: To provide the display of a direct viewing type having good image quality of a high contrast ratio by using a light scattering type liquid crystal.

CONSTITUTION: This electrode display device is formed by laminating a liquid crystal display part 10 consisting of a light source 30, a 1st transparent substrate 11 provided with 1st driving electrodes 13, a light scattering type liquid crystal layer 15, and a 2nd transparent substrate 12 provided with 2nd driving electrodes 14 and a scattering display means 40 for diffusing the light transmitted through the liquid crystal layer 15 and is constituted to impress the voltage controlling the orientation of the light scattering type liquid crystal layer 15 between the 1st driving transparent electrodes 13 and the 2nd driving transparent electrodes 14 from a driving control means 20. A 1st irradiation angle limiting means 50 for limiting the irradiation angle of the light from the light source 30 is provided between the liquid crystal display part 10 and the light source 30 of the above-mentioned device and a 2nd irradiation angle limiting means 60 for limiting the irradiation angle of the light from the light source 30 is provided between the liquid crystal display part 10 and the diffusion display means 40.



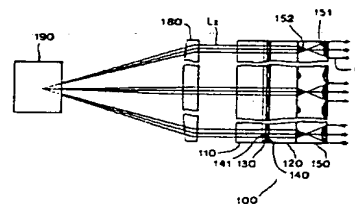
a: picture element in OFF state, b: picture element in ON state

(54) LIQUID CRYSTAL PANEL DEVICE

(11) 5-53101 (A) (43) 5.3.1993 (19) JP
 (21) Appl. No. 3-236987 (22) 22.8.1991
 (71) SHARP CORP (72) MITSUO NAKAYAMA
 (51) Int. Cl.⁵ G02F1/1335

PURPOSE: To obtain the liquid crystal panel device which does not necessitate a lens of a large aperture by providing such a microlens substrate capable of rendering an emitted light into a parallel light.

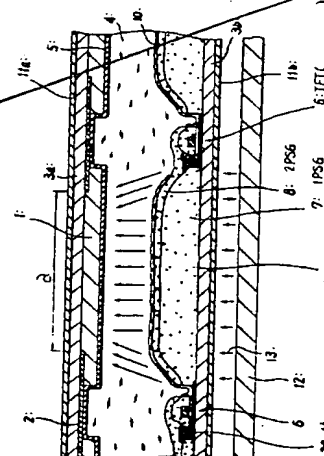
CONSTITUTION: In a liquid crystal panel device 100, a microlens substrate 150 which condenses an incident light L_1 , which is made incident, and converts the condensed incident light L_1 to a parallel light corresponding to an opening of a black matrix 140 is provided on the incident side. The microlens substrate 150 is provided on a common side glass substrate 120 in close contact thereto, in a state that a lens function is added to both the surface and the reverse side, and on a light source side, and on a reverse light source side (that is, the face for coming into contact with the common side glass substrate 120), a first lens part 151 for condensing the incident light L_1 , and a second lens part 152 for converting the incident light L_1 to the parallel light are formed, respectively. In such a state, an emitted light L_2 is made incident on a projection lens 190 through a field lens 180, and since the emitted light L_2 is the parallel light, the projection lens 190 does not necessitate a lens of a large aperture, and a lens of a small diameter is enough.

**(54) LIQUID CRYSTAL DISPLAY DEVICE**

(11) 5-53102 (A) (43) 5.3.1993 (19) JP
 (21) Appl. No. 3-212217 (22) 23.8.1991
 (71) SONY CORP (72) MASAKI MUNAKATA
 (51) Int. Cl.⁵ G02F1/1335, G02F1/1333

PURPOSE: To provide the liquid crystal display device which does not darken at the time of an all white display and can obtain a high contrast ratio, even if a black matrix is provided between color filters.

CONSTITUTION: The liquid crystal display device consists of a picture element electrode 10 arrayed like a matrix, an active matrix substrate 3b having an active switching element 6 for driving this picture element electrode, an opposed substrate 3a opposed to this active matrix substrate 3b, and a liquid crystal layer 4 inserted and held between the active matrix substrate 3b and the opposed substrate 3a, and between the active matrix substrate 3b and the picture element electrode 10, a microlens 26a consisting of an insulating film is formed.



1: color filter layer, 2: black matrix layer, 3: common electrode, 5: TFT (thin film transistor), 7: first PSG layer, 8: second PSG layer, 12: backlight module, 28: A/V signal line, a: opening part, 11a, 11b: polarizing plate